

PATENT SPECIFICATION

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DRAWINGS ATTACHED.

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COMPLETE SPECIFICATION.

Improvements in or relating to Manual Welding Units.

We, ZENTRALINSTITUT FÜR SCHWEISSTECHNIK DER DEUTSCHEN DEMOKRATISCHEN REPUBLIK, of 33a, Köthener Strasse, 403 Halle/Saale, Germany, a Corporation organised under the laws of Eastern Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a manual gas-shielded arc welding unit which combines a welding wire feed mechanism and a contact and guide tube in one structural unit, by which an endless, gas-shielded wire electrode may be arc welded.

Manual welding units for gas-shielded arc welding are known in which a wire feed mechanism and a welding torch including a welding nozzle from entirely separate structural units. During the welding process, the welding wire is conveyed through a contact and guide tube by means of the wire feed mechanism. Moreover, a pistol-type manual welding unit is known in which an endless wire electrode is pulled by a feed mechanism into the pistol and fed to the contact and guide tube. In other known welding units both push and pull feed are employed. In these pistol-type manual welding units, a driving motor may be mounted with its axis in the direction of feed of the welding wire or may be mounted in a handle inclined to said feed direction. Moreover, in manual welding units the supply lines for feeding the welding wire, the welding current, the shielding gas and the control current connect with several separate connecting points, the endless wire electrode being pulled by rollers located within the welding unit or outside it.

Portable welding units are also known which are carried on the operator's back.

In these units the welding wire is fed forward to the welding torch by the wire feed mechanism which is on the back of the welder. The wire feed mechanism together with a supply reel of the welding wire may likewise be housed in a portable unit.

In both types of welding unit welding wire is fed through a fairly long flexible wire supply device to the welding torch.

In known welding units, the wire feed mechanism is driven by an electric motor or a pneumatically driven motor. Electric feed motors are controlled by relays in order to permit sudden stopping of the wire feed. In the case of heavier welding units, i.e. equipment for welding with wire of the order of 1.6 mm. thick, a change of location is, generally speaking, possible only if some auxiliary means is employed; unless, of course, the equipment is mobile. Usually several parts of the equipment, such as the welding unit, the power source, and the shielding gas supply cylinder, have to be separately transported to the site. Welding sets in which the welding unit and the cylinder are arranged on the power source are heavy for their size, being compactly constructed and require a good highway system. Staircases and steps become disagreeable obstacles. A quick change of location or the use of bulky units over a wide operating radius is not an economical proposition. The operating radius is often only enlarged by the use of slewing devices and the construction of roadways.

Welding units having a fairly long wire feed line leading to a light welding torch, have the disadvantage that in the case of thin wires in particular, the wire may not emerge from the contact and guide tube at a uniform speed or that the wire may buckle between the wire feed roller and the guide tube or at some other point.

In practice portable welding units must be carried by two handles and it is not usually possible to transport the welding unit as well as other parts of the welding equipment, such as the power source or the gas cylinder, at one and the same time.

To summarise, it may be said that known pistol-type manual welding units are disadvantageous in that they cannot be handled easily and are heavy for their size. To their own heavy bulk must be added that of the welding wire reel. This fact becomes significant when one considers that at times the welder has to hold the manual welding unit for considerable periods at the same time guiding it with great accuracy. Welding sets with wire supply lines from the wire supply reel to the welding torch which are more than 4 m. in length are constructed, as was described above, so that the wire is pulled by a wire feed mechanism in the welding torch. However, when changing the wire considerable difficulties may be encountered and a great deal of time consumed in pushing the latter through the long wire supply line.

Due to the fact that the various supply lines lead into the manual welding units from several directions, the equipment is subject to a shift in the distribution of weight, so unfavourable that the welder has, in addition, to apply a considerable force to hold the welding unit in a balanced position.

Welding units which are carried on the welder's back have the disadvantage that a heavy one-sided load is present; for both the welding wire supply and the wire feed mechanism (motor and transmission mechanism) act as a load upon one point of the body of the welder.

Welding equipment in the form of a portable set will clearly have to be put down during the welding process but when welding is carried out under assembly-line conditions, this may not always be possible.

The basic aim of the invention is therefore to provide a lightweight, manual, gas-shielded arc welding unit which handles easily, for welding an endless wire electrode of a diameter of preferably less than 1.2 mm., in a gas envelope.

In accordance with the invention, there is provided a manual gas-shielded arc welding unit having a built-in wire feed mechanism, wherein the unit is portable and includes an elongated contact and guide tube, and a handle housing a wire feed mechanism, and wherein the handle includes a partly or wholly double-walled handle section defining a passage for the shielding gas, the arrangement being such that the unit can be cooled by the shielding gas flowing there-through.

In order that the manual welding unit

may be easily held in a balanced position, all the connecting lines, i.e. the lines for the endless wire electrode, the welding current, the shielding gas and the control current are so arranged that they leave the unit in the direction of an extension of the unit axis. Moreover, the welding current is supplied in the manual welding unit to an elongated contact and guide tube by means of the motor securing bolts of the driving motor or by means of some other structural element.

By selecting suitable materials the housing may be made externally electrically dead, i.e. electrically safe, and heat-insulated; whereas good thermal conductivity obtains within the housing. The electric motor for the wire feed mechanism is controlled by means of a change-over switch located in the handle section. After the welding process has been completed, the armature of the separately excited direct current motor is shorted in order to obtain a braking effect.

In order to increase the range of adjustment of the wire feed speed, the mechanical transmission of the wire feed mechanism is so constructed that by interchanging two change-speed gears, two speeds may be obtained. This speed-changing can be carried out without dismantling the unit.

The manual welding unit may be connected in series with one or more units by unscrewing the elongated contact tube from one unit and screwing a wire feed tube to the said unit, said wire feed tube leading to the next unit. Thus the endless wire electrode is pulled by the first unit which is in the hand of the welder and pushed or pulled by the welding units located behind it. Thus the connecting lines between the wire supply reel, and the manual welding unit may be more than 10 m. long.

For a better understanding of the invention reference will now be made, by way of example to the accompanying drawing which is a cross-sectional view of a manual welding unit according to one embodiment of the invention.

The manual welding unit shown in the drawing has a built-in wire feed mechanism consisting of a motor 12 and a gear transmission 13, contained in a casing in the form of a welding torch.

The casing includes a handle section 11 which serves as a casing or sheath for the motor 12. The handle section 11 is double-walled in construction so that the welding unit can be cooled by the supply of protective gas required to shield the arc.

A wire feed roller 16 draws the welding wire 19 forward to an elongated contact and guide tube 15, which may be curved, as shown. This tube 15 is also interchangeable and can be set in various directions.

The welding unit is externally insulated

by the use of an electrically non-conductive material e.g., plastics. The supply lines 18, 20 for the welding current and the shielding gas respectively, the wire 19 and a control line 17 connected to a switch 14 for switching the wire feed motor 12 on and off, lead into the welding unit in an axial direction, from one end thereof.

The supply of welding current to the tube 15 is effected through the stator securing bolts of the motor 12.

Two interchangeable change-speed gears (not shown) in the gear transmission 13 permit wire feed at two different speeds.

The manual welding unit which combines the wire feed mechanism with the change-over switch and the welding torch in a single structural unit, has the advantage with regard to its welding characteristics that good current conduction from the contact tube 15 to the endless welding wire 19 is always ensured, because the wire 19 is always in good contact with the contact tube 15 on account of the curved "blowpipe" shape of the latter.

The logical arrangement of the motor 12, the transmission 13, the elongated contact tube 15 and the supply lines permits of an exceptionally light unit of less than 900 grm. weight and ensures that the unit will be easy to handle even when difficult welding operations are being carried out. Since several units may be connected in series, the supply lines between the welding wire supply reel and the welding unit held by the welder may be more than 10 m. long. The manual welding unit may, therefore, perform welding operations in installation and repair work, in various trades and in the home and on thin sheet metal, which could previously be carried out only by flame welding processes.

WHAT WE CLAIM IS:—

1. A manual gas-shielded arc welding

unit having a built-in wire feed mechanism, wherein the unit is portable and includes an elongated contact and guide tube, and a handle housing a wire feed mechanism, and wherein the handle includes a partly or wholly double-walled handle section defining a passage for the shielding gas, the arrangement being such that the unit can be cooled by the shielding gas flowing there-through.

2. A manual welding unit as claimed in Claim 1, wherein connecting lines for an endless wire electrode, the welding current, a shielding gas and the control current for a driving motor of said feed mechanism are so arranged that they leave the unit in the direction of an extension of the unit axis.

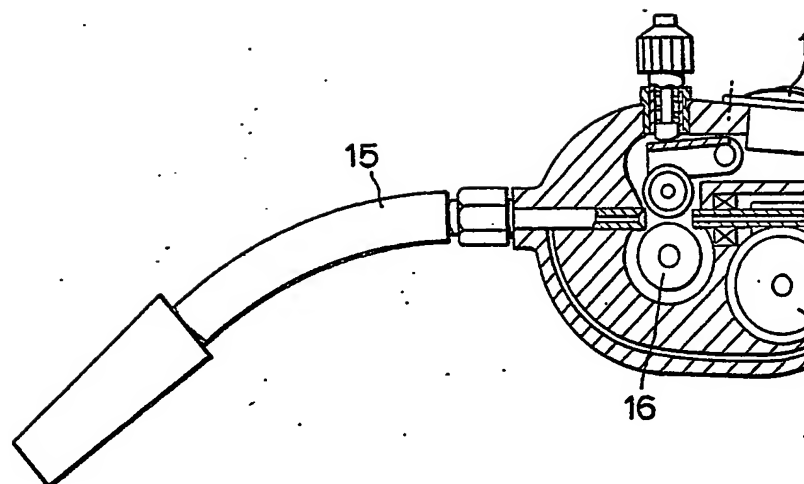
3. A manual welding unit as claimed in Claim 2, wherein the supply of the welding current to an elongated contact and guide tube of the unit is effected through the stator securing bolts of the driving motor and wherein the handle section is externally electrically dead and heat-insulated.

4. A manual welding unit as claimed in Claim 1, 2 or 3, wherein the elongated contact and guide tube is removable and replaceable by a wire feed tube to permit the connection of several units in series.

5. A manual welding unit as claimed in Claim 1, 2, 3 or 4 and comprising means for changing the wire feed speed by means of change-speed gears in the wire feed mechanism.

6. A manual gas-shielded arc welding unit substantially as hereinbefore described with reference to and as illustrated in the accompanying drawing.

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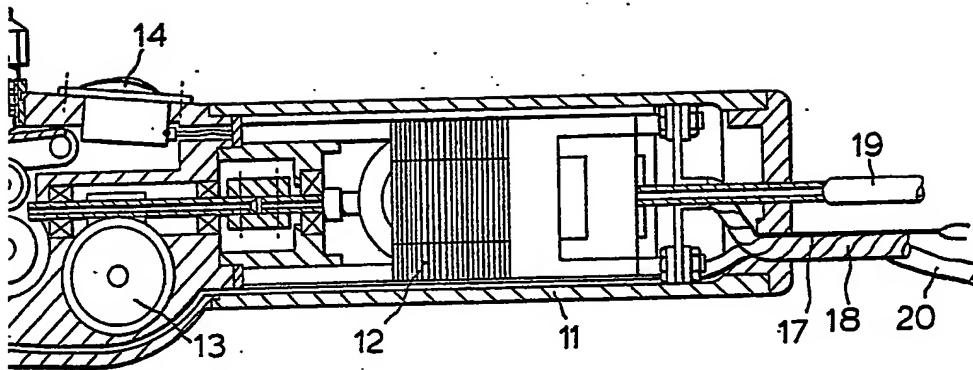


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COMPLETE SPECIFICATION

1 SHEET

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the Original on a reduced scale*



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